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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/721,464

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Hideki Shoji

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C. IRVIN MCCLELLAND
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER

TIBBITS, PIA FLORENCE

ART UNIT

PAPER NUMBER

2838

DATE MAILED: 09/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/721,464

Applicant(s)

SHOJI, HIDEKI

Examiner

Pia F. Tibbits

Art Unit

2838

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-78 is/are pending in the application.
- 4a) Of the above claim(s) 2,4,6,8,10,12,14,16,18,20,22 and 24-78 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,5,7,9,11,13,15,17,19,21 and 23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

This Office action is in answer to the amendment filed 6/30/2006. Claims 1-78 are pending, of which claim 1 is amended, while claims 2,4,6,8,10,12,14,16,18,20,22 and 24-78 are withdrawn.

1. Applicant's request for reconsideration of the election requirement is acknowledged. However, applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, as required by **MPEP 818.03** which (a) states that "As shown by the first sentence of 37 CFR 1.143, the traverse to a requirement must be complete as required by 37 CFR 1.111(b) which reads in part: "In order to be entitled to reconsideration or further examination, the applicant or patent owner must reply to the Office action. The reply by the applicant or patent owner must be reduced to a writing which distinctly and specifically points out the supposed errors in the examiner's action and must reply to every ground of objection and rejection in the prior Office action. The applicant's or patent owner's reply must appear throughout to be a bona fide attempt to advance the application or the reexamination proceeding to final action." Applicant made an election with traverse of claims 1,3,5,7,9,11,13,15,17,19,21,23, which was acknowledged in the non-final Office action mailed on April 5, 2006, where applicant was informed that since applicant did **not** distinctly and specifically point out the supposed errors in the restriction requirement, the election was treated as an **election without traverse. MPEP 818.03**. The requirement is still deemed proper and is therefore made **FINAL**. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (**37 CFR 1.144**). See **MPEP § 821.01**.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1,3,5,7,9,11,13,15,17,19,21,23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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Claim 1: the first step recites "measuring at a plurality of battery temperatures a cycle test battery in respect of one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging at **predetermined** time intervals". Applicant amended to recite in the second step "using measured values to generate a determination table showing relationships between charge amounts and degradation states at **prescribed** time intervals". It is not clear what the difference is between "**predetermined** time intervals" and "**prescribed** time intervals".

However, the specification describes at paragraph [0009] "The invention also provides a method of confirming battery charge amount and degradation state comprising **the steps of measuring** at a plurality of battery temperatures a cycle test battery using measurements of at least two selected from battery open voltage, current and voltage during discharge, and current and voltage during charging **at predetermined time intervals substantially until battery end of life**, using measured values to generate determination tables showing relationships in each case between prescribed charge amounts and prescribed degradation states, measuring a subject battery in respect of said at least two selected from battery open voltage, current and voltage during discharge, and current and voltage during charging, and comparing determination table values with each of measured values of the subject battery to confirm present subject battery charge amount and degradation state according to determination table locations of matching values, and **simultaneously** using an incidence of appearance at the determination locations resulting from the measured values to estimate present subject battery charge amount and degradation state".

To continue prosecution it was assumed that the step of measuring and the step of using measured values are used **simultaneously**, i.e., at **predetermined** time intervals.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1,3,5,7,9,11,13,15,17,19,21,23 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Kawakami et al.** [6563318]

As to claim 1, Kawakami discloses in figures 1-34 a method of confirming battery charge amount and degradation state, comprising the steps of:
measuring at a plurality of battery temperatures a cycle test battery in respect of one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging at predetermined time intervals substantially until battery end of life [see e.g. column 4, lines 61-67; column 5, lines 45-55];

The detecting method according to the present invention comprises: (i) a step in which a plurality of normal non-deteriorated rechargeable batteries are provided, these batteries are separately subjected to charging and discharging under various **temperature** conditions and at various rates of charge or discharge where their battery voltages, and their presently stored electricity

(2) For a normal rechargeable battery in a full charged state, battery voltages V_d are measured under various **temperature** conditions T and at various discharge rates I_d . The charging is tentatively suspended, where the open-circuit voltage (V_{oc}) is measured. Data or function formula $V_d(V_{oc}, I_d, T)$ of the relationship of the battery voltages V_d to the I_d , V_{oc} and T . Or the data or function formula $V_d(Q, I_d, T)$ or $Q(V_d, I_d, T)$ computed from the data or function formula of the relationship of the $V_{oc}(Q)$ of the open-circuit voltage (V_{oc}) to the remaining capacity (Q) described in the above (1).

using measured values to generate a determination table showing relationships between prescribed charge amounts and prescribed degradation states [see e.g. column 3, lines 25-30; column 52, lines 49-56; column 53, lines 37-46];

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a method wherein for a rechargeable battery, the battery voltage when a prescribed current is applied for a prescribed period of time is measured and the measured battery voltage is collated with a previously established battery voltage-residual capacity corresponding table to obtain a residual capacity of the battery. However, for a rechargeable battery

In this embodiment, from the curves of the battery characteristics obtained in this way, the open-circuit voltages to optional remaining capacities were read to obtain discrete data and based on the discrete data, a data base (a data table) for the relationship of the open-circuit voltage V_{oc} to the remaining capacity Q was prepared. In addition, from the data base, a function formula $V_{oc}(Q)$ of an approximate curve with respect to said data base.

In Table 1 as an example of the foregoing data tables obtained in the above for the lithium ion rechargeable battery (having a diameter of 17 mm, a length of 67 mm, and a nominal capacity of 1300 mAh), there are shown relationships of the open-circuit voltage $V_{oc}(V)$ to the remaining capacity Q [Ah] upon the discharging operation and those of the battery voltage $V_d(V)$ at each of constant currents I_d (=0.13 A, 0.26 A, 0.65 A, 1.3 A, 1.95 A, and 2.6 A) when the battery temperature is 25.degree. C. to the remaining capacity Q [Ah] upon the discharging operation.

measuring a subject battery in respect of same said one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging [see e.g. column 4, lines 59-67; column 5, lines 1-17; column 6, lines 24-32];

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The detecting method according to the present invention comprises: (i) a step in which a plurality of normal non-deteriorated rechargeable batteries are provided, these batteries are separately subjected to **charging and discharging** under various temperature conditions and at various rates of **charge or discharge** where their battery voltages, and their presently stored electricity quantities (their electricity quantities capable of being **discharged**) or their **discharging** capacities are obtained, and from these factors, basic data are obtained; and (ii) a step in which for a rechargeable battery (ii-a) to be detected, the voltage value or/and the current value thereof are measured, and the measured result is compared with said basic data to judge: (a) the rechargeable battery (ii-a) is short-circuited, (b) the internal resistance of the rechargeable battery (ii-a) is increased, (c) the electricity storable capacity (the quantity of electricity capable of being stored) of the rechargeable battery (ii-a) is decreased, (d) the electricity storable capacity of the rechargeable battery (ii-a) is decreased and the internal resistance thereof is increased, or (e) the rechargeable battery (ii-a) is not deteriorated (normal).

According to the detecting method for detecting internal state of a rechargeable battery in the present invention, on the basis of the foregoing basic data or function formulas and in accordance with a prescribed judgment mode while referring to information selected from the open-circuit voltage, battery voltage and internal resistance of a rechargeable battery to be detected in a shutdown state, a **charging** state, or a **discharging** state, it is possible to precisely detect the internal state of rechargeable battery.

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FIGS. 18(1) to 18(3) and FIGS. 19(1) to 19(2) are of a normal rechargeable battery and they show respectively a relationship of the open-circuit voltage, the charging voltage or the discharging voltage, the internal resistance and the open-circuit voltage, the battery voltages at two kinds of discharge rates (discharging currents), and the discharging voltages at two kinds of battery temperatures, respectively in relation to the remaining capacity.

FIG. 32 shows a graph of a change with the passage of time in the battery voltage when a commercially available lithium ion rechargeable battery whose nominal capacity is 1300 mAh was subjected to constant current-constant voltage charging and thereafter, a cycle of conducting discharging operation and pausing the discharging operation was repeated.

and

comparing determination table values with a measured value of the subject battery to confirm present subject battery charge amount and degradation state in accordance with a determination table location of matching values states [see e.g. column 3, lines 25-30; column 52, lines 49-56; column 53, lines 37-46; tables 1-8];

In this embodiment, from the curves of the battery characteristics obtained in this way, the open-circuit voltages to optional remaining capacities were read to obtain discrete data and based on the discrete data, a data base (a data table) for the relationship of the open-circuit voltage V_{oc} to the remaining capacity Q was prepared. In addition, from the data base, a function formula $V_{oc}(Q)$ of an approximate curve with respect to said data base.

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TABLE 1

remain- ing capacity (Ah)	V _{oc} (V)	V _d (V) I _d = 0.13A	V _d (V) I _d = 0.26A	V _d (V) I _d = 0.65A	V _d (V) I _d = 1.3A	V _d (V) I _d = 1.95A	V _d (V) I _d = 2.6A
1.3	4.169	4.172	4.158	4.094	4.043	3.959	3.894
1.2	4.111	4.077	4.052	3.945	3.851	3.728	3.619
1.1	4.044	4.012	3.980	3.876	3.779	3.654	3.545
1.0	3.985	3.944	3.911	3.804	3.710	3.558	3.500
0.9	3.933	3.893	3.850	3.757	3.665	3.555	3.450
0.8	3.879	3.841	3.811	3.705	3.611	3.501	3.408
0.7	3.833	3.795	3.767	3.656	3.563	3.463	3.378
0.6	3.806	3.772	3.745	3.629	3.538	3.440	3.356
0.5	3.786	3.755	3.717	3.606	3.510	3.427	3.320
0.4	3.770	3.724	3.690	3.567	3.474	3.375	3.290
0.3	3.747	3.701	3.670	3.547	3.457	3.358	3.268
0.2	3.712	3.680	3.642	3.507	3.425	3.316	3.215
0.1	3.676	3.622	3.583	3.409	3.334	3.226	3.125

TABLE 2

	open-circuit voltage (V)	detected remaining capacity (Ah)	discharged quantity (Ah)	(detected remaining capacity-discharged quantity)/nominal capacity × 100 (%)
Sample 1	4.008	1.0583	1.0612	-0.2231
Sample 2	3.817	0.6583	0.6712	-0.5077
Sample 3	3.735	0.2710	0.2812	-0.7846

With regard to the patent additionally considering an internal resistance for the subject/inspective battery for detecting the subject/inspective battery charge amount and degradation state: eliminating considering an internal resistance for the subject/inspective battery, cited in the Kawakami reference, applicant neither confirms the charge amount, nor makes it easier to accurately gauge the remaining charge and degradation state of a battery, which is the object of his invention, as cited in the disclosure. Therefore it would be obvious to one skilled in the art at the time the invention was made that the elimination of an element and its function in a combination is an obvious expedient if the remaining elements perform the same functions as before. See *Ex parte Wu*, 10 USPQ 2031 (Bd. Pat. App. & Inter. 1989), *In re Larson*, 340 F.2d 965, 144 USPQ 347 (CCPA 1965) and *In re Kuhle*, 526 F.2d 553, 188 USPQ 7 (CCPA 1975).

As to claims 3,5,7,9,11,13,15,17,19,21,23, see remarks and reference above.

Response to Arguments

6. Applicant's arguments with respect to the claims have been considered but are moot in view of the new grounds of rejection. Applicant amended the claim to include "at prescribed time intervals", which is new issue.

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Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art cited in PTO-892 and not mentioned above disclose related apparatus.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Pia Tibbits whose telephone number is 571-272-2086. If unavailable, contact the Supervisory Patent Examiner Karl Easthom whose telephone number is 571-272-1989. The Technology Center Fax number is 571-273-8300.

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PFT

Pia Tibbits



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September 7, 2006

Primary Patent Examiner